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RE: Changes to the 2017 Vermont Stormwater Management Manual Rule

Dear Representative French and Members of the Committee,

The Agency has made the following changes to the 2017 Vermont Stormwater Management Manual Rule, in response to public comments and based upon the Agency's final review of the Rule. The "Response Summary" included with this rulemaking package further explains the reasons for these changes.

§ 1.0 Introduction and Purpose.

In response to comment, the Agency has added further detail as to what the Agency will review when it reviews the Manual at least every five years. The added language states, "At the time of review, the Secretary shall determine the average phosphorus load reduction from new development across the entire Lake Champlain Basin and within each lake segment, since implementation of this Manual. If the phosphorus loads from new development are not being reduced by at least 70%, on average, the Secretary shall determine whether changes are needed to this Rule or other statutory or regulatory schemes to achieve the necessary phosphorus reductions." See Response Summary, Comment/Response 5B.

§ 1.2 Anti-degradation.

In response to comment and upon further consideration, the Agency removed reference to "cost effective" STPs from this section of the Manual. Such reference was determined to be inconsistent with stormwater treatment practice (STP) selection under the Water Quality Treatment Standard (WQTS), for which cost is not a feasibility consideration. Instead, the Agency has opted to reference the highest "practicable" level of STPs, which is more representative of the best management practice (BMP) approach typical of stormwater treatment and control.

In addition, in consideration of comments pertaining to the forthcoming Anti-Degradation Rule, the Agency further revised this section of the Manual to remove redundant language, which is already included in the Interim Anti-Degradation Implementation Procedure (October 2010) and which could be subject to change as part of the future Anti-Degradation Rule. For in-line changes see Response Summary, Comment/Response 87.

§ 2.2.2 Runoff Reduction Framework.

Table 2-2, *Stormwater Treatment Practices that Reduce Runoff*, was revised to remove reference to *unlined* bioretention areas, *unlined* dry swales, and *unlined* filtering systems, in consideration of comments received that advocated for structural practices to be lined only when determined necessary, such as for stormwater runoff contributing from hotspot land use or activity. The table now lists bioretention areas, dry swales, and filtering systems "designed for infiltration." See Response Summary, Comment/Response 39.



§ 2.2.3 Groundwater Recharge Standard.

Table 2-3, *List of Practices Acceptable for Meeting Groundwater Recharge Standard*, was revised to remove reference to unlined practices, in consideration of comments received that advocated for structural practices to be lined only when determined necessary, such as for stormwater runoff contributing from hotspot land use or activity. The table now lists structural STPs “designed for infiltration.” See Response Summary, Comment/Response 39.

§ 2.2.4.1 Water Quality Practice Selection.

The Agency made several changes to this section of the Manual in response to various comments received from both non-government organizations and municipalities.

Changes were made to § 2.2.4.1(c) and (d), and the Tier specific criteria that follow, to further clarify that designers must first evaluate the ability to use Tier 1 STPs, and subsequently Tier 2 STPs, prior to consideration of using pre-existing STPs or other Tier 3 STPs. This section also used the term “not possible” and “infeasible” interchangeably, which presented confusion. This section of the Manual now eliminates use of the term “not possible” and relies solely on “infeasible.” For in-line changes see Response Summary, Comment/Response 5C.

Additionally, the Tier STP tables included in this section were also revised to remove reference to lined practices, in consideration of comments received that advocated for structural practices to be lined only when determined necessary, such as for stormwater runoff contributing from hotspot land use or activity. The table is now reflective of structural STPs “designed for infiltration” or “not designed for infiltration,” as applicable. See Response Summary, Comment/Response 8 and 39.

§ 2.2.4.3 Time of Concentration.

In response to feedback from Otter Creek Engineering (OCE), during their preparation of 2017 VSMM design examples per contract with the Agency, this section was revised to allow for additional methods of calculating the average catchment slope (Y). Slope may now also be determined pursuant to, “any of the methods included in Section 630.1502(a) of the NRCS National Engineering Handbook.”

§ 2.2.5.1 Hydrologic Condition Method.

In response to feedback from OCE and comment, this section was revised in several locations as follows.

- This section was revised to clarify the Runoff depth (Q) equation, by adding “ $Q = 0$ for $P < 0.2 * S$,” which was not specified in the prior draft Manual.
- Discussions with OCE highlighted that clarification was needed pertaining to the requirements for characterizing existing impervious and pervious area when modeling storm events. This section was revised in consideration of the feedback and for consistency with Section 2.2.6, Overbank Flood Protection Standard (Q_{P10}), and Section 2.2.7, Extreme Flood Protection Standard (Q_{P100}).
- **Table Error! No text of specified style in document.-1.** *List of Practices Acceptable for Meeting the Channel Protection Standard through Hydrologic Condition Method* was revised to remove reference to unlined practices, in consideration of comments received that advocated for structural practices to be lined only when determined necessary, such as for stormwater runoff contributing from hotspot land use or activity. The table is now reflective of structural STPs designed for infiltration. See Response Summary, Comment/Response 39.

§ 2.2.5.3 Calculating Adjusted Curve Numbers.

In response to feedback from OCE, this section was revised for clarity. The equation for Q_{Rem} was clarified by adding a definition of Q_{Post} , which is “the post-development runoff for the design storm before treatment.”

§ 2.2.6 Overbank Flood Protection Standard (QP10).

In response to feedback from OCE, during their preparation of 2017 VSMM design examples per contract with the Agency, this section of the Manual was revised to allow for waiver of the Overbank Flood Protection (QP10) Standard when the pre-routed, post-development discharge for the 10-year, 24-hour storm is less than 2 cubic feet per second, consistent with the established waiver of the Channel Protection Standard. In effect, this avoids small projects or projects that will generate minimal stormwater runoff from their site from having to construct structural detention practices for what amounts to no measurable impact. The new language states that compliance with the Overbank Flood Protection Standard shall not be required if, “The pre-routed, post-development discharge for the 10-year, 24-hour storm is less than 2 cubic feet per second. “Pre-routed post-development discharge” means the runoff after development, including post-development conveyance, but without STPs. When examining whether or not the site qualifies for this waiver, off-site runoff does not need to be considered, however the overall common plan of development shall be considered.”

§ 2.5 Downstream Analysis for QP10 and QP100.

Public comment highlighted that the terms “facility,” “practice,” and “STP,” were used interchangeably in many locations throughout the Manual, beginning in Section 2.5. As such, the Agency revised the Manual to exclusively use the term “practice” or “STP” when referring to a stormwater treatment practice.

§ 3.2 Post-Construction Soil Depth and Quality Treatment.

In response to comment, the Agency revised the organic matter requirements for compost. It was not the intent of the Agency to restrict compost to those composts with an organic content of between 40 and 65%, which is not representative of all available products that may meet the definition of “compost.” The Agency intended the range of 40 to 65% to be applicable to “pre-approved mixing rates” only as established by Options 2 and 3 of § 3.2. Thus, the 40 to 65% organic matter requirement has been removed from the general compost requirements and moved to the “pre-approved rate” requirements under Options 2 and 3. . In addition, the Agency did not intend on limiting imported materials to topsoil, but would allow for compost or other required materials to be imported as necessary to meet the requirement. The Agency has since revised Option 4 to read “Import topsoil mix, or other materials for mixing, including compost, of sufficient organic content and depth.” See Response Summary, Comment/Response 23 and 78.

§ 4.1.2.2 Filter Strip Design.

The reference to “clean” stone has been removed from this section of the Manual and later references throughout. The term “clean” was determined to be unnecessary and subjective. See Response Summary, Comment/Response 24.

§ 4.1.3 Sediment Forebay and § 4.1.3.1 Sediment Forebay Design.

In response to comment, the Agency eliminated the option for use of gabion baskets as an acceptable forebay barrier. In addition, the term “gabion” was removed from § 7.0 Definitions, in consideration that the term “gabion” is no longer used in the Manual. See Response Summary, Comment/Response 25.

§ 4.1.4.1 Deep Sump Catch Basin Feasibility.

The Agency modified the design description of this pre-treatment practice in consideration of public comment, to allow for more cost-effective use of the practice, and greater design flexibility, through the option for buried pipe connection rather than restricting the practice to catch-basin to man-hole configuration. The change is as follows: “~~Deep sump catch basins used as pretreatment devices shall be located “off-line” —designed in a catch basin to manhole configuration with no inlet pipes to be used as pretreatment for other practices , with connections to downstream structures taking place at manholes or buried pipe connections, but shall not contain inlet pipes from other structures.~~ Catch basin-to-catch basin or inlet-to-inlet configurations are acceptable for conveyance, but they shall not be counted as a pre-treatment practice.” See Response Summary, Comment/Response 26.

§ 4.1.5.2 Proprietary Devices Design and § 4.4 Alternative Stormwater Treatment Practices.

The Agency modified the requirements of for proprietary pre-treatment devices and alternative stormwater treatment practices in consideration of public comment, to ensure that flow based proprietary practice removal efficiencies are based on the peak associated with the water quality storm (Q_{wq}). See Response Summary, Comment/Response 73 and 74.

§ 4.2.2. Simple Disconnection and § 4.2.3.4 Disconnection to Filter Strips and Vegetated Buffers.

In response to public comment, designers may now rely solely on HSG mapping for determining disconnection length requirements. In addition, feedback from OCE, during their preparation of 2017 VSMM design examples per contract with the Agency, highlighted an issue with the required terracing, berms, or similar grade controls, on slopes in excess of 8%, as specified in § 4.2.2.1 Simple Disconnection Feasibility. Terracing and grade controls, even on slopes of up to 15%, were not shown in modeling to provide further benefit and may preclude the use of stormwater disconnection, where otherwise feasible. Further review and consideration by the Agency in regards to this requirement led to removal of this from § 4.2.2 and § 4.2.3 of the 2017 VSMM. Had this been required under Disconnection to Filter Strips and Vegetation Buffers (§ 4.2.3), it would have forced disturbance of filter strips or naturally vegetated buffers for installation of grade controls.

In addition, the work with OCE identified potential issues with disconnections only being credited with the WQ_v , under the Hydrologic Condition Method (HCM) of the Channel Protection Standard. In consideration of this issue, the Agency reviewed modeled scenarios used for established disconnection lengths and T_v credit, and found that disconnections over HSG A soils (or where the infiltration rate is ≥ 1 inch per hour), could receive additional T_v credit under the HCM. Changes reflecting these additional options were made to both § 4.2.2.4 Simple Disconnection Treatment and § 4.2.3.4 Disconnection to Filter Strips and Vegetated Buffers Treatment. In cases where soils are less permeable (HSG B, C, D soils), compliance with the Channel Protection, Overbank Flood Protection, and Extreme Flood Protection Standards may require the use of additional STPs in addition to the disconnection, as noted in the Manual.

§ 4.2.4.2 Watershed Hydrology Protection Conveyance and Treatment.

The Agency has added the requirement for headwall structure protection at cross-drainage locations to the “Required Elements – Collection and Bypass of Runoff and Groundwater.” The new language states, “Headwall structure protection shall be provided at cross-drainage locations at both the inlet and outlet, and additional stabilization as necessary at outfall for energy dissipation.” See Response Summary, Comment/Response 35.

§ 4.3.1 Bioretention.

The Agency removed the brief reference to “rain gardens” which added confusion to this practice design and was duplicative with bioretention. The design specifications for bioretention will not prohibit or restrict designers’ ability to design or implement small scale bioretention systems, sometimes referred to as rain gardens.

Minor changes were also made to § 4.3.1.2 Bioretention Conveyance, § 4.3.2.2 Dry Swales Conveyance, and § 4.3.4.2 Filtering Conveyance, to provide clarification regarding underdrain construction and stone placement. The changes in § 4.3.1.2 are as follows, “Underdrained bioretention practices shall be equipped with a minimum 6-inch perforated pipe underdrain (8 inches is preferred) in a minimum 1-foot deep stone layer. Within the stone layer the underdrain pipe shall be separated by at least 3 inches from the bioretention media and 2 inches from the bottom of the practice. Synthetic filter fabrics shall not be used to completely separate the filter media from the underdrain bedding material. See Response Summary, Comment/Response 38 and 39.

Section 4.3.1.4 Bioretention Treatment was also modified to specify the bioretention surface treatment must be something inert, such as stone, rather than mulch, which tends to float. This section was also revised to restrict available phosphorus to a low P bioretention soil mix and to better align phosphorus testing methods with those that are locally available. The language changes are as follows:

- Bioretention systems shall consist of the following treatment components: a 24 to 48-inch deep planting soil bed (depending on the requirements of proposed vegetation), a ~~mulch surface layer or other surface treatment that suppresses weed growth and , such as stone or other inert material that minimizes exposed soil,~~ and a 6 to 12-inch deep surface ponding area. Soils shall consist of USDA sand to loamy sand classification and meet the following graduation: sand 85- 88%, silt 8-12%, clay 0-2%, and organic matter in the form of compost 3-5%.
- The designer shall identify on the plan sheet that a soil phosphorus test using the ~~Mehlich-3 method~~ Morgan Method, or approved equivalent, is required for facilities with underdrains, to ensure that bioretention soil media will not leach phosphorus. ~~The phosphorus index (P-index) for the soil must be low, between 10 and 30 milligrams per kilogram~~ The “available phosphorus” for the soil must be less than 0.2% phosphorus. The plan shall also identify that the record of the phosphorus test shall be maintained with design or permit records for subsequent design certification requirements.

Additionally, the following sentence was added to § 4.3.1.4 to specify that bioretention practices shall only be lined if necessary, “Bioretention practices shall not be lined unless required due to hotspot land use or other site specific factor, subject to Agency approval.” See Response Summary, Comment/Response 38 and 39.

§ 4.3.3.2.1 Soil Testing Requirements for Infiltration Practices.

The Agency removed the second bullet in this section that specified the education and experience required for soil testing professionals conducting testing. The language in the previous draft relied on other certification or licensing programs that are subject to change. See Response Summary, Comment/Response 52.

§ 4.3.5 Treatment Wetlands Conveyance.

In response to comments, because the Treatment Wetlands section of the Manual includes both Shallow Surface Wetlands and Gravel Wetlands, modifications were made to better organize these two unique wetland design variants. The section has been reorganized to establish separate lists of requirements for Shallow Surface Wetlands and Gravel Wetlands for ease of reference. See Response Summary, Comment/Response 58.

§ 4.3.8 Permeable Pavement.

The Agency removed the restriction on the use of permeable pavement where road sanding is performed in the winter, which in consideration of public comment, is a maintenance related issue. Similarly, the Agency removed the prohibition of tree planting immediately adjacent to pervious pavements. The Agency expects to provide similar language to the Manual when repackaged with guidance, however this will no longer be an all-out restriction which could altogether prohibit its consideration. See Response Summary, Comment/Response 70 and 71.

Please let me know if you have any questions about the foregoing changes.

Sincerely,



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